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Project Description

1.1 Introduction

The New Hampshire Department of Transportation (NHDOT) is preparing an Environmental Impact Statement (EIS) for proposed improvements to the I-93 corridor between Salem and Manchester, New Hampshire. The basic purpose of the I-93 Salem-Manchester project is to improve transportation efficiency and reduce safety problems associated with this approximately 18-mile segment of I-93 from the stateline to Manchester. A Scoping Report, documenting the first phase of the EIS study process, was completed in May 2000.

This Rationale Report documents Phase II of the EIS study process and includes the conceptual development, evaluation, and screening of the study alternatives identified in the *Scoping Report* for this project. An evaluation of each of the alternatives is presented as well as the rationale for eliminating specific alternatives from further consideration. The evaluation process used for this project, and for this report, comply with the ACOE guidelines under the *Highway Methodology* for documenting the selection of a "reasonable range of alternatives" as defined by the National Environmental Policy Act (NEPA) and Section 404 of the Clean Water Act (CWA).

1.2 Study Area

The segment of I-93 being studied is located in southern New Hampshire (Figure 1-1), beginning at the Massachusetts border in Salem and proceeding northerly through the five communities of Salem, Windham, Derry, Londonderry and Manchester, with the northerly limit being the I-93/I-293/NH101 split in Manchester. The segment includes 5 interchanges.

The primary Study Area is generally defined as a band approximately 500 feet east and west of the existing I-93 northbound and southbound lanes, and has a minimum width of 1,000 feet, with additional width where the I-93 northbound and southbound barrels diverge. In the vicinity of each of the five interchange areas, the

Study Area extends to each side of the existing I-93 right-of-way approximately 2,000 feet along the connecting roadways for a width of approximately 1,000 feet. The Study Area is relatively confined given that there is no consideration of relocating the highway beyond the general limits of the existing corridor.

The primary Study Area boundaries identify the area within which highway improvements are anticipated as previously identified in the *Scoping Report*. They do not however limit the evaluation of Traffic Demand Management (TDM) measures, mass transit alternatives and regional conformity with respect to air quality, which may logically extend beyond the primary Study Area.

In addition, for the purpose of evaluating secondary and cumulative impacts, consideration will be given to those areas serviced by, and thus subject to the influence of, the I-93 highway corridor along the 18-mile segment under study. These areas may fall outside of the primary Study Area as well.

1.3 Traffic Conditions

I-93 is a limited (fully controlled) access interstate highway within New Hampshire. It functions as a north-south principal arterial highway. For the segment under study, it presently consists primarily of four lanes (two lanes northbound, two lanes southbound except south of Exit 1 where three lanes in each direction exist) and remains largely unchanged since it was constructed in the 1960's. At the Massachusetts state line in Salem, traffic today exceeds 105,000 vehicles per day (vpd) and is expected to exceed 137,000 vpd by the Year 2020.

During weekday peak hours, motorists traveling along the I-93 corridor currently experience traffic congestion and substantial delay. Operating conditions during the peak hours are currently poor with the segments of the corridor south of Exit 4 operating at Level of Service (LOS) E or F. (See Section 4.2.2 for a complete description of LOS.)

As traffic volumes increase, traffic operations are expected to continue to deteriorate under future conditions resulting in increased congestion along the mainline of I-93 and at the corridor interchanges, as well as along nearby local roadways.

During the early stages of this study, the NHDOT developed a statewide transportation corridor model to evaluate existing and future traffic conditions within the I-93 corridor. The NHDOT statewide model provides the basis for all of the traffic volumes generated for the project. The traffic volumes in turn have been used to identify and quantify future traffic conditions based on input variables for potential conceptual alternatives.

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Conceptual Alternatives

2.1 Introduction

A number of conceptual alternatives were identified in the *Scoping Report*. These alternatives provide a reasonable range of solutions to address the purpose and need of the I-93 Salem-Manchester project. The five basic types of alternatives are listed below and discussed in more detail in the following chapters:

- no build,
- providing additional lanes to the existing highway,
- implementation of Transportation Demand Management (TDM) strategies,
- implementation of Transportation System Management (TSM) improvements, and
- combinations of these.

Alternative highway corridors involving relocating I-93 (or sections thereof) are not considered viable options because of the magnitude of investment and current traffic patterns associated with the existing facility.

2.2 General Description of Alternatives

The following sections describe each of the basic types of alternatives. A more detailed description of the various conceptual alternatives developed within each type is presented in Chapters 3 and 4.

2.2.1 No Build

The No Build Alternative is essentially the continuation and perpetuation of the existing situation and the shortcomings inherent on the present highway corridor. Given the base year Average Daily Traffic (ADT) volumes, which range from 61,800 vehicles per day (vpd) between Exits 3 and 4 to 104,400 vpd south of Exit 1, and the 20-year No Build ADT volumes, which range from 73,000 vpd to 137,000 vpd at the same locations, this alternative would not meet the project purpose and need, and in fact would result in a worsening situation relative to transportation safety and mobility. As such, the No Build Alternative is not considered a viable alternative, but will serve as a baseline condition for comparison with other alternatives.

2.2.2 Adding Lanes to Existing Highway

Concepts for addressing existing and future travel demands for the I-93 corridor include adding travel lanes to the existing highway. Alternatives to be considered involve widening the existing highway from two lanes in each direction to either three or four lanes in each direction. Relative to the widening alternative, incorporation of high occupancy vehicle (HOV) lanes (discussed in Section 2.2.2.1) to serve immediate or future needs is a further consideration.

Widening the highway to a total of either 3 or 4 lanes in each direction will require consideration of future plans for I-93 in Massachusetts. Today I-93 in Massachusetts, as it approaches the New Hampshire border, is a 6-lane highway (3 lanes in each direction). Recent construction south of Massachusetts Exit 47 (1.3 miles south of the New Hampshire state line) currently allows the highway shoulder to be used as a fourth travel lane during commuter hours. Recognition of travel demand and safety issues relating to this project may lead to further transportation improvements and could result in additional widening of the highway in Massachusetts. In addition, Massachusetts is conducting a planning study to investigate transportation improvement alternatives along the I-93 corridor between Andover, MA and the New Hampshire state line in Methuen.

At the northern terminus of the project study limits in Manchester, I-93 is a 6-lane highway (3 lanes in each direction) with additional lanes to accommodate the weaves and ramps necessary for the I-93/I-293/NH 101 Interchange and highway splits and merges in the Manchester area. Adding additional lanes south of the I-93/I-293/NH 101 split may require some additional pavement in the interchange area to provide efficient and safe transitions.

Current interchange configurations and connecting roads within the study area will be evaluated for possible design improvements to accommodate the widening and existing and projected traffic demand, as appropriate, based on current AASHTO and NHDOT design standards.

2.2.3 Transportation Demand Management Strategies

Transportation demand management (TDM) encompasses a variety of strategies that are designed to change personal travel behavior to reduce the demand for automobile use and the need for highway capacity expansion. This is accomplished through measures that reduce the number or length of drive-alone trips or that move trips out of times of peak roadway congestion.

TDM measures focus on providing incentives (or disincentives) to drivers who drive alone to encourage them to change their travel behavior to rideshare or use another mode of travel. This discussion of TDM measures does not include consideration of major infrastructure investments to provide and expand alternative modes of transportation such as HOV lanes, park and ride facilities, bus services, and rail service. Options for providing these types of improvements to serve the I-93 corridor are described and analyzed in detail in Chapters 3 and 5.

Another measure designed to reduce peak hour traffic flow on highways is ramp metering and it is discussed in Section 4.5.2. Ramp metering is included as a transportation system management measure because its primary purpose is to maximize the efficient utilization of the highway system. It can have the effect of encouraging ridersharing and transit use, but it can also cause traffic to divert to other routes and shift the locations of roadway congestion and delay.

2.2.3.1 Employer Based Measures

This section focuses on programs that are designed to encourage and support the use of alternatives to driving alone. TDM programs are generally targeted at work trips because commuters account for most peak-hour travel (the periods of regular roadway congestion) and because work trip patterns are generally consistent from day-to-day. TDM strategies are most effective in changing commuting behavior if they are implemented through employers. As a result, employers are frequently responsible for funding TDM programs, at least in part. This reliance on private funding differentiates TDM programs from more traditional transportation services and creates opportunities for public/private partnerships to address transportation issues.

Nationally, a large variety of TDM strategies have been adopted. The most commonly implemented strategies include:

- Programs that encourage the use of transit, such as on-site sale of transit passes, employer shuttles to transit stations, employer subsidies for transit use, and adequate parking at transit stations.

- Ridematching programs and preferential parking at the work site for carpools and vanpools.

- Bicycle and pedestrian amenities such as bicycle storage, showers and lockers, and improved pathways and access.

- Support programs for those who commute via alternate modes, such as on-site services (shopping, banking, and day care) and guaranteed ride home programs.

- Variable work arrangements and work hours such as telecommuting, flextime, and compressed work weeks.

Implementation of TDM programs may occur voluntarily or may be required through government regulations. The government also encourages TDM programs through financial incentive programs.

Implementation of voluntary TDM programs is frequently facilitated through rideshare brokerages or transportation management associations (TMAs). Both are public/private partnerships that design, market, and implement programs that support commuting alternatives and administer incentives to employees who use the alternatives. These organizations also collaborate with state and local governments, public agencies, and transit operators to increase the availability of transportation alternatives.

Although these organizations exist in a variety of sizes and operational structures, they generally use government support in combination with private funding, which is obtained through cash grants, member dues, fees for services, or in-kind contributions. Rideshare brokerages offer area-wide services, but also work with individual employers to implement TDM programs at individual work sites. TMAs are groups of employers that band together to address specific transportation issues in their area by implementing TDM measures for member employers.

Typically both types of organizations work with employers to provide a variety of TDM programs including ridematching, on-site transit pass sales, employer shuttles to transit, guaranteed ride home programs, parking management, flexible work hours, and telecommuting. In addition, these organizations offer technical assistance to employers, provide marketing materials, and sponsor promotional events to educate employees about their commuting options.

The majority of work related travel along the I-93 corridor is to workplaces in Massachusetts. These include employers in downtown, employers along the I-95 (Route 128) and I-495 circumferential highways around Boston, and employers along I-93 between I-95 and the New Hampshire state line. Employer based TDM measures that would impact the I-93 corridor in New Hampshire would need to be implemented largely in Massachusetts.

Massachusetts has a number of TMAs that provide a full range of services to many New Hampshire residents who work along the I-93 corridor and in Boston. The Massachusetts TMAs that have the greatest likelihood of influencing travel on the I-93 corridor in the study area are:

- The River Road TMA in Andover

- Junction TMO (Transportation Management Organization) in the Ballardvale Street/Lowell Junction area of Andover and Wilmington
- The Artery Business Committee TMA in Boston
- Commuter Works/MASCO in Boston (Longwood Medical and Academic Area)
- The Interinstitutional TMA in Boston (Boston Medical Center)
- The Logan TMA at Logan Airport
- The Seaport TMA in South Boston
- The Charles River TMA in Cambridge
- The 128 Business Council TMA

2.2.3.2 Congestion Pricing

Congestion pricing is essentially a TDM strategy that provides a financial disincentive to driving alone during peak periods of travel.[1] Congestion pricing is based on the market–based concept that those who demand use of a facility should pay for the capacity required to supply an adequate level of service on the facility. This suggests that drivers, during the highest demand periods, would change their travel behavior in order to maximize their individual utility.

Congestion pricing involves charging a premium price for use of a transportation facility during periods of congestion. This could involve imposing a charge during peak periods for a facility that is otherwise free of charge or it could involve charging a higher fee during peak periods on an existing toll facility.

Congestion pricing serves to reduce overall roadway delays on a facility by:

- diverting drivers to alternative routes of travel;
- causing drivers to share a ride to reduce individual expenses:
- changing time of travel to times of reduced or no congestion; and
- increasing the cost of travel and eliminating some trips altogether.

In addition to reduced delays, congestion pricing provides benefits by:

- raising revenues to provide improved transit service and/or other alternatives to single occupant vehicles (SOVs);
- raising revenues needed to maintain and improve the roadway system; and
- reducing vehicle miles traveled (VMT) thereby reducing emissions.

The main disadvantages of congestion pricing include:

- **adverse impacts on low income and disadvantaged groups** -- congestion pricing could be viewed as a regressive tax, in that it is not tied to a person's ability to

[1] Implementing Effective Traffic Demand Management Measures: Inventory of Measures and Synthesis of Experience, prepared by Comsis Corporation and the Institute of Transportation Engineers, for the U.S. Department of Transportation, DOT-T-94-02, September, 1993, p. 1-1.

pay the fee. It is widely believed that congestion pricing will have a greater impact on low income and disadvantaged persons.[2] One proposed solution is to use revenue from tolls to offset the costs to low income groups by providing discounted tolls or, if adequate transit alternatives are in place, subsidies for bus/transit passes.

- **impacts of traffic diversions on local streets and other roadways that serve as alternative routes --** congestion pricing may adversely affect communities adjacent to priced corridors because drivers will divert to nearby routes which are not priced in order to avoid the tolls.[3] In fact, route diversion, rather than time or mode diversion, will be the most likely effect of congestion pricing.

- **actual and perceived lack of convenient transportation options to tolled roadways --** congestion pricing and alternative modes go together. The Urban Mass Transportation Administration (UMTA) experience points out that a charge for the use of roadway space will not be publicly accepted unless a viable, visible, and well-publicized alternative mode of transportation is provided for the affected area and for affected users.[4] Again, if alternative modes are not available, many drivers have little choice but to take an alternate route, or pay the toll.

- **opposition by some commercial interests -- c**ongestion pricing represents an increased cost of doing business, which could adversely affect local businesses. sending or receiving deliveries. In many cases business and delivery schedules have already been adjusted as much as possible and further shifting away from peak periods would not be possible.

- **concern that revenues will not be used for the transportation purpose for which they were collected, or in the areas where they were collected --** revenues hold one of the keys to the political and public success of congestion pricing.[56] There are a number of options for the use of revenues and there may be concerns that over time, revenues would not be used as proposed. Particular concern focuses on revenues being diverted to other facilities or areas where congestion pricing is not in place.

There are four general types of congestion pricing projects:

- Including variable toll facilities as part of constructing a new highway facility.
- Instituting variable tolls on existing toll facilities, through either peak-period surcharges or off-peak discounts.

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[2] Lari, Adeel Z. and Kenneth R. Buckeye, "Measuring Public Acceptability of Congestion Pricing Options in Minnesota," ITE 1996 Compendium of Technical Papers, p. 476.
[3] Ibid., p. 476.
[4] Arrillaga, Bert, "U.S. Experience with Congestion Pricing," ITE Journal, December 1993, p. 42.
[5] Van Hattum, David, "Political and Institutional Issues in Congestion Relief Tolls--Report on a National Study," ITE Journal, October 1996, p. 47.
[6] Small, Kenneth, "Using the Revenues from Congestion Pricing," Transportation, Vol 19, p. 359-381

- Adding variable tolls to existing non-toll facilities.
- Selling surplus capacity on high occupancy vehicle facilities to drivers willing to pay for the use of the facility. These types of facilities are also known as HOT (High Occupancy free/others Tolled) lanes.[7]

The easiest form of providing congestion pricing is by making it a part of a brand new highway facility that will serve as another corridor to an existing transportation system. In doing so, the facility can be completely modern, other routes will exist, and the toll charges can be easily justified as necessary to support the construction cost, as well as the maintenance cost of the new facility.

The second easiest form of providing congestion pricing is to convert an existing toll facility from charging uniform tolls to charging variable tolls. If drivers are already accustomed to paying a toll, then the practice of varying the toll by time of day or by vehicle occupancy can be a logical next step. In doing so the facility should be outfitted with electric toll collection equipment to ease congestion and delay at the tolls and provide additional incentive to participate in the automated program.

A third way of providing congestion pricing is to convert a non-toll facility to a variable toll facility. Such a conversion is difficult to accomplish. Toll facilities need to be constructed, not only at the terminal of the highway facility, but at the interchange locations where traffic is entering or exiting the highway. To address the capacity needs through the toll access, additional highway widening is required with further impact to the environment and surrounding properties. Electronic toll collection should be incorporated to minimize delays as much as possible. It should also be noted that the ability to place tolls on interstate highways that currently do not have tolls is limited by federal law. Such toll initiatives must be carried out under the auspices of one of two available programs, following approval of application.

A fourth means of utilizing the concept of congestion pricing involves constructing a barrier-separated HOV system (physically separated HOV lane with individual on and off ramps independent of general purpose lanes and interchange ramps) and making available, for a price, the use of the HOV facility by single occupancy vehicles. High occupancy vehicles (HOVs) would travel in the HOV lane for free, but the single occupancy vehicles (SOVs) would pay a toll, with the cost depending on the congestion in the general purpose lanes. Such HOV facilities are known as HOT lanes. The benefit of such a facility is that the ridership in the facility can be maximized by varying the toll cost and thus the incentive/disincentive to SOV motorists to use the HOT lanes. The drawback of such a facility is that the HOV system is expensive as it is separate from, and essentially independent of, the general purpose lane system; the facility requires a toll collection component which introduces additional costs and results in some delay that would otherwise not exist

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[7] "HOT Lane" is a recent term devised by economists at the University of California-Irvine and the Reason Foundation.

for HOV's; and the facility is perceived to cater to the well off who can more readily afford to pay this toll.

The potential success of congestion pricing depends on the extent of congestion, the capacity and availability of alternative routes and modes, and the type of project employed. If congestion is already spread over several hours of the day, rather than concentrated in discrete, short time periods, then congestion pricing may not be very effective. Motorists may not see the benefit from shifting to another time period if congestion is still present. If reasonable alternative modes of travel are not available, then motorists are most likely to divert to an alternative, and possibly inappropriate, route near the priced facility.

If the system to be fitted with congestion pricing in a toll facility, public acceptance is likely to be more forthcoming. Infrastructure costs would be less and thus more palatable as well. If the system is a non-toll facility, then necessary infrastructure for congestion pricing will be substantially more expensive both in terms of construction as well as environmental and property costs, and public acceptance is likely to be more difficult to obtain. To incorporate congestion pricing through the use of a HOV system, infrastructure costs (as well as environmental and property impacts) are substantial, and public perception that the system benefits the well off calls into question the merits of such an arrangement.

In terms of I-93, congestion pricing is not recommended because I-93 currently experiences peak periods of congestion of approximately three hours in length in both the morning and the evening, as discussed in Section 5.3.2.3. Peak period spreading has already occurred to a great extent, and disincentives to further spread the congestion period into additional hours will likely be unacceptable. Instead congestion pricing is likely to be perceived as a solution that does not address congestion, but simply levies a tax on those who must use the facility. Currently, the I-93 corridor does not have many suitable alternative routes or alternative modes of transportation. Existing bus service, even if improved, can only serve a limited number of commuters, and will be subject to the same congestion as other vehicular traffic during peak hours. Lastly, as a non-toll facility, public acceptance of making I-93 a toll facility would be difficult at best. Where toll facilities exist in New Hampshire there is considerable public sentiment to eliminate the toll status. Additional impacts associated with toll facilities would be problematic. Similarly HOT lanes would be greatly questioned particularly in light of the findings relative to the lack of HOV lane usage as outlined in Section 5.3.4.3.

2.2.4 Transportation System Management Improvements

Transportation System Management (TSM) improvements are low-cost measures to reduce congestion and improve safety. TSM improvements are typically limited by the width of the existing right-of-way. Examples of TSM improvements include the construction of turning lanes, re-striping lane uses, installation of traffic signals or upgrading existing signals. In addition TSM improvements could involve the utilization of Intelligent Transportation Systems (ITS) technology, such as variable message boards and emergency communications to ease congestion and enhance safety.

In the case of the I-93 corridor and interchanges, a number of TSM improvements are proposed to be evaluated. They include:

- ITS strategies,
- adding traffic signals at selected locations (i.e. Exit 3 ramps at NH 111),
- minor widening and re-striping at intersections (i.e., Exit 2 at Pelham Road)
- improving acceleration and deceleration lanes (i.e., I-93 SB at Exit 5).

TSM improvements are not in and of themselves the solution to the long-term needs of I-93. They may provide some immediate relief in advance of the long-term solutions to be approved and constructed.

2.2.5 Combinations of Alternatives

During the alternatives development process it may become apparent that a combination of alternatives will provide the most benefit to the project and best meet the project's purpose and need. Each of the alternatives will be evaluated with the potential of combining it with other alternatives, where practical, to provide the most effective range of reasonable alternatives.